

REPORT
OF THE
COMMITTEE ON WATER SUPPLY

OF THE
Town of Southborough

NOVEMBER, 1929

SOUTHBOROUGH PRINT SHOP
Southborough, Massachusetts

MARLBOROUGH

NORTHBOROUGH

WESTBOROUGH

SOUTH BOROUGH

FRAMINGHAM

ASHLAND

HOPKINTON

ASHLAND

Compiled from available maps and miscellaneous data.

1000 0 1000 2000 3000 4000 5000
SCALE IN FEET (APPROX.)

Drawn by...S.A.W.
Traced by...S.A.W.
Checked by...S.A.W.

MAP OF
SOUTHBOROUGH, MASS.

SHOWING PROPOSED
WATER DISTRIBUTION SYSTEM

NOVEMBER 1929
METCALF & EDDY
ENGINEERS
BOSTON, MASS.

To the inhabitants of the Town of Southborough:

We have the honor to report of an investigation which we have made relative to a public water supply for the Southborough Township.

In the opinion of the Committee, we have engaged one of the best qualified water engineers in this section of the country, to conduct the survey, namely, the firm of Metcalf & Eddy, with business offices located in the Statler Building, Park Square, Boston. The report of the engineer's survey appears hereinafter.

1. Because the engineer entertained the idea of sinking wells for a water supply, various waters were examined. As a result of this analysis, the engineer reported that the bacterial examinations of the waters in the Cordaville and Southville wells showed that the water was unsatisfactory for drinking purposes, on account of the presence of bacteria of a human origin. Therefore notice of this analysis was forwarded to the Chairman of the Board of Selectmen, and also to the Chairman of the Board of Health, and the people in the said districts were in turn notified by the Town officials.

2. The existing condition of the water supply in the School Departments induced the School Committee to take precautionary measures and supply the school children with spring water for drinking purposes. It also made necessary the hauling of water for sanitary purposes.

3. Under date of September 20, 1929, the Metropolitan Commission forwarded a letter of information relative to the installation of a sewerage system. That letter, in part, is as follows:

"The rules and regulations of the State Board of Health for sanitary protection of waters used for water supply, under authority of Chapter 488 of the

Acts of 1895, provide that no human excrement or house slops or sink waste should be discharged into said waters. Whether or not this rule would be violated by the use of cesspools after the water supply is installed, depends upon the location of the premises with reference to the water courses and also in large degree upon the character of the soil. If such violation occurs, the parties can be prosecuted, **but I know of no law under which the Commission could compel the Town to install a sewerage system."**

4. The Committee, through the Chairman, interviewed the Marlborough Water Board, to determine as to whether or not it would be possible to contract with said city for a water supply for the Town of Southborough. This interview proved conclusively that it would not be practical from a business standpoint, because the control of the water supply would be vested in the Marlborough Water Commission. Therefore the Committee were of the opinion that it would not be advantageous to the Town of Southborough and considered the investigation completed, with the recommendation that no further action be taken in behalf of the Town.

5. In view of the fact that the Town is considering putting in a water supply, it was deemed advisable by the Committee to ascertain whether or not it would be possible to have gas installed in the trenches, which would be dug for the water mains, at the same period of time. The Marlborough Gas Company was interviewed by the Chairman of the Committee, who was informed by the Company officials that they would be pleased to install gas mains in the water trenches at the same time that the water mains were being installed, provided that a sufficient number of consumers would agree to install gas, in order to provide enough revenue to make the expenditure of this capital profitable for the Gas Company.

6. a. The question of a Town Water System, excluding Fayville, is incorporated in the engineer's report on Page 19.

b. The question also of a Water District, excluding Fayville, is incorporated in the engineer's report on Page 20.

c. The question of a Town water supply, including Fayville, was discussed at the various meetings of the Committee. The Committee and engineer are of the opinion that this would be the most efficient system to have installed. This could be done simply by connecting the pipe lines to the Fayville District, thereby making it one Town system, and by assuming the financial obligations of the contractual responsibilities of the Fayville Fire and Water District.

Mr. Theodore N. Wardell, Director of Accounts, the recognized authority on town government and procedure, was interviewed at his office, at the State House. He expressed himself as being of the opinion that the most efficient and most economical method of procedure is a permanent water supply for all the people of the Town.

7. Although Southborough is practically surrounded by water, and although we have the storage basin for the water supply of the Metropolitan District Commission for the city of Boston, the Town itself is not provided with a permanent water system. It is the only town between Boston and Worcester which has not a public water supply for drinking purposes and for fire protection. On the North, South, East and West of the Town, we have Marlborough, Northborough, Westborough, Hopkinton, Ashland, and Framingham, each and every one of which has a public water supply.

8. An editorial, which appeared in the Boston Post, on August 20, 1929, is incorporated in this report for the purpose of bringing to your attention the necessity of installing a permanent public water supply.

"LOOK OUT FOR THE WATER"

"That is very good advice which Dr. Clarence H. Scammon, the Deputy Commissioner of the Massachusetts Department of Health, has given gratis to all touring automobilists. It is to beware of the 'babbling brook' as a temporary water supply. 'Ninety-six percent of the water in the State used for drinking purposes, is available through public water supplies,' he says. With this in mind, it seems there is no reason why any person should take a chance and drink from some countryside brook, unless the drinker is absolutely sure that the water is not polluted. The brook may be clear and sparkling and yet contain the germs of typhoid or some other disease. Shun it. If the cities are far apart, take along enough water in bottles to do for the journey. Better to be safe than sorry."

9. The following is a list of towns in Massachusetts having a population between 1700 and 3000, in 1925, that have public water supplies:

Town	1925 Population	Owned by
Deerfield	2968	South Deerfield Water Supply Dist. Deerfield Fire Dist.
Cohasset	2913	Cohasset Water Company
Weston	2906	Town
Lenox	2895	Lenox Water Company
Hadley	2888	Hadley Water Supply District
Belchertown	2877	Belchertown Water District
Wilbraham	2833	From Springfield
Holliston	2812	Holliston Water Company
Pepperell	2779	Town
Norton	2769	Norton Water Company
Scituate	2713	Scituate Water Company
Hatfield	2702	Town
Lancaster	2678	Town (Clinton water supply)

Hull	2652	Hingham Water Company
Hopkinton	2580	Town
Kingston	2524	Town
Ashland	2521	Town
Manchester	2499	Town
Groveland	2485	Town (Haverhill water supply)
Groton	2428	West Groton Water Supply District
Acton	2387	West and South Water Supply District
Shirley	2394	Shirley Village Water Dist.
Douglas	2363	Town
Avon	2360	Town
Merrimac	2349	Town
Wayland	2255	Town
Rutland	2236	Town
Hanson	2166	Supplied in part by Brockton
Ashburnham	2159	Town
Southborough	2053	Fayville Fire and Water Dist.
Williamsburg	1993	Town
Northborough	1968	Town
Cheshire	1842	Cheshire Water Company
Stockbridge	1830	Stockbridge Water Company; Hill Water Company
Northfield	1821	Northfield Schools, Inc. Northfield Water Company
Salisbury	1820	Salisbury Water Supply Co.
Millis	1791	Town
Marshfield	1777	Public Supply; Humarock Water Co.
Chatham	1741	Town—under construction
Westwood	1706	Westwood Water Company; supplies Islington

10. After careful investigation of the cost by the engineer and the Committee, we find that the cost to the citizens of the Town, if a Town Water Supply is installed, as reflected in the tax rate, would be, at the highest year, \$5.85 per thousand. This increase does not include the actual cost of water to users. (The rates indicated on Page 25 of the engineer's report, would apply if a District were formed). The additional tax rate would be offset to some extent by a reduction in fire insurance rates. The elimination of the present motor driven pumps in the homes, would effect a further saving in electricity.

11. The Committee has taken up with the New England Insurance Exchange the question of reduction in rates, and will be prepared to report on that particular phase of the question at the Town Meeting.

The committee through its chairman interviewed the Commissioners of the Fayville Fire and Water District for the purpose of determining as to whether or not the Fayville Fire and Water District would join the remaining sections of the Town for the purpose of establishing one Town system.

Letter Appears Hereinafter

Mr. George A. Mooney, Chairman November 22, 1929
Southborough Water Committee
Southville, Massachusetts

Dear Sir:

At a meeting held November 21, 1929 I was directed to inform you that after due consideration of the "Report to the Water Committee of the Town of Southborough upon proposed Water Works", the Special Committee appointed to install the Fayville Fire and Water System unanimously agreed that the Fayville Fire and Water District could in no possible way be benefited by amalgamating with a Town Water System or by forming a District consisting of the Villagers of Southborough, Cordaville and Southville as a Water District. It was further voted that the Committee appreciates the courtesy extended to them to consider a possible union with the other sections of the Town in establishing a new Fire and Water District.

Yours truly,

Dana J. Kidder, Clerk.

Recommendations

The engineer, the fire chief and the Committee are unanimously of the opinion that the installation of a permanent water supply would greatly reduce the fire hazards in many sections of the Town.

In view of the facts that appear hereinbefore, the Committee are of the opinion that it will be for the best interest of all the people of the Town if a permanent public water supply be installed for the entire Township, provided that the Fayville Fire and Water District are willing to co-operate; otherwise the next best thing to do is to form a Water District by selecting certain areas in Southborough, Southville, and Cordaville.

Respectfully submitted,

George H. Burnett

John J. Flannery

Patrick H. Brock

E. Warren Ward

George A. Mooney, Chairman

Water Committee,
Town of Southborough, Massachusetts,
Gentlemen:

In accordance with our agreement we have made a study of the problem of obtaining a water supply from the Sudbury Reservoir and of the distribution of the water in the town to meet the needs of the several communities, and present the following report with recommendations and estimates of cost.

Benefits From Water Works

One of the greatest assets to a community, comparable with good schools, is a public water works system supplying an abundance of pure and wholesome water. This fact is becoming so well recognized that there are but few towns in Massachusetts having a population of 3,000 or over that are without public water supplies. Among the smaller towns in Massachusetts, having populations of 2,000 to 3,000, as of 1925, two-thirds of them have such supplies.

One of the chief advantages of the public water system is fire protection. This not only results in a saving in cost of fire insurance, but reduces the hazard of loss of life and valuables, for which losses no amount of insurance can compensate.

Another benefit arises from the relative ease with which a public water supply may be maintained in a safe and sanitary condition. Private wells may be contaminated and occasionally such contaminated wells cause sickness and death.

Because of the general installation of water works throughout the country, people are becoming more and more reluctant to move into towns without such convenience. The installation of a water works system is usually followed by increased values in property and increased prosperity.

The convenience of obtaining ample water in the home, by the mere turn of the faucet, may be contrasted with the hard work of hand pumping and carrying water, or in many cases with the trouble and expense of installations of power-operated pumps and pressure tanks, or the trouble that results when private supplies go dry.

Few, if any, expenditures of public funds return so much in health, comfort and safety as do those made for water supply purposes. When compared with other commodities, water is the cheapest necessity that is purchased.

Water Rights

The Town of Southborough entered into an agreement with the City of Boston, February 14, 1894, which stipulated among other things that

"Said town may take water from said basin (Sudbury Reservoir) for the purposes of a public water supply for said town not exceeding two hundred thousand (200,000) gallons per day, and may do all necessary and reasonable acts to take said water."

This right was not exercised to any appreciable extent until 1923 when the Fayville Fire and Water District was established in accordance with Chapter 474, Acts of 1923, which provided that

"Said district may take, as a part of the water supply to which the Town of Southborough is entitled . . . from the Sudbury Reservoir of the metropolitan water system, situated in the town of Southborough, or from any available outlet leaving from said reservoir, water to an amount not exceeding seventy-five thousand gallons per day . . ."

A distribution system is now under construction, which when completed will take water from the reservoir at Worcester Turnpike for that part of the town within the Fayville Fire and Water District.

The remainder of the town, therefore, still has the right to about one hundred twenty-five thousand gallons per day of water from the Sudbury Reservoir. Water to this amount can be taken without charge other than the expense to the town of installing the necessary pumping plant and distribution works and the operation and maintenance of the same.

Population

The 1925 state census showed that the resident population of the Town of Southborough was 2,053, which is the highest figure recorded by a census since 1895, at which time the population of the town was enlarged by the construction forces building the Sudbury Reservoir and appurtenant works.

The population of the town according to the census figures has been as follows:

1890	2,114
1895	2,223
1900	1,921
1905	1,931
1910	1,745
1915	1,898
1920	1,838
1925	2,053

The 1925 census was not separated according to communities, but such figures were recorded in the 1915 census. These figures, together with estimates of a future distribution of population, are as follows:

	Census of 1915	Estimated Future
Southville	272	360
Cordaville	215	280
Southborough	990	1,360
Otis Corner	39	(1)
	<hr/> 1,516	<hr/> 2,000
Fayville	368	500
Oregon	14	(2)
	<hr/> 1,898	<hr/> 2,500

(1) Included with Southborough

(2) Included with Fayville

The population of the town in 1915, excluding Fayville, was 1,516, or about eighty percent of the population of the whole town. At the present time it is estimated that the population of the town as a whole is in the vicinity of twenty-two hundred and of that portion outside of the Fayville Fire and Water District, about eighteen hundred. In addition, the students at Fay School and St. Mark's School number about three hundred.

In planning for a new water system provision should be made for at least twenty-five hundred persons in the whole town and two thousand persons in the town outside of the Fayville District. It may be some years, however, before that number of people will be served.

Estimated Water Supply Requirements

The consumption of water by the town may average about sixty-five gallons per capita served per day, assuming the system to be well built and well maintained.

On this basis, average and maximum daily uses of water may be estimated as follows:

Persons Served	Average Daily Consumption in gallons	Maximum Daily Consumption in gallons
1000	65,000	98,000
1500	97,500	147,000
2000	130,000	195,000
2500	162,500	244,000

The above figures do not include water used by any dairy or industrial establishment.

The Sudbury Reservoir as a Source of Water Supply

It is natural that the town should look to the Sudbury Reservoir for its supply of water. While the quantity that may be taken without payment is limited by the agreement, this quantity should be ample for the needs of the town for many years to come.

A study of analyses of water in the reservoir at various points indicates that water of better quality can be obtained from the northern half of the reservoir, and it is with this fact in mind that the proposed intake has been located as shown in Fig. 1. This general location may also be advantageous if construction explorations show the presence of suitable sand deposits from which the water could be taken by wells, so as to get the benefits of natural filtration through the soil.

If the water is taken directly from the reservoir, it will be somewhat higher in color and there may be at times some taste and odor that would not be found if the water is taken from wells supplied largely from the reservoir. The water should be sterilized with chlorine as a safeguard against possible danger from contamination.

Intake and Pumping Station

If water is taken directly from the reservoir, it will be drawn through an intake laid on the bottom of the reservoir in deep water and below ground in shallow water and on the shore to the pumping station. The water entering the suction well in the pumping station will pass through screens to exclude leaves and fish, will be treated with chlorine and then will be pumped into the distribution system. If the water is obtained from wells, these will be driven along the shore and will be connected by piping to the pump suction.

The pumping station will consist of a concrete substructure and a brick superstructure of fireproof construction. Space will be provided for two vertical triplex plunger pumps of about two hundred gallons per minute capacity, each driven normally by an electric motor, and a gasoline engine for use as a standby in case of failure of the electric power. The equipment can be designed to be semi-automatic in operation to avoid the necessity of constant supervision. The building will have a separate room for the chlorine equipment.

Proposed Water Works

A number of projects have been studied for distributing water to the town, exclusive of the Fayville Fire and Water District. Consideration has been given to separate sources of water supply for the several communities as well as a common source and the effect on the cost and efficiency of the distribution system. The most advantageous project is that which serves the three villages, Southborough, Cordaville and Southville, from one pumping station. It is proposed to take water from Sudbury Reservoir at a point adjacent to Framingham Road, near East Main Street, as previously described, and to pump the water through cast iron pipes laid in East Main Street to

Newton Street, thence through Main Street to Cordaville Road, thence through Cordaville Road to Cordaville and thence through Highland Street to Southville. Water mains would be laid, also, in other streets of the town to serve the three villages, as shown on the accompanying plan.

It is proposed to locate a steel standpipe of 400,000 gallons capacity at a suitable elevation on Clear Hill, between Newton Street and Framingham Road, and a standpipe of 250,000 gallons capacity on the high land to the north of Highland Street, in Southville.

Such a system would make available for fire fighting flows of 1,500 gallons per minute (g.p.m.) at the center of Southborough, 1,000 g.p.m. at Cordaville and 750 g.p.m. at Southville. Somewhat smaller rates of flow could be maintained in other sections, depending upon the distance from the center of the particular village. These rates of flow have been computed with the standpipe only half full of water and with a residual pressure of 20 pounds per square inch in the main at the hydrant, which latter is in accordance with the requirements of the National Board of Fire Underwriters, where the fire department has a pump-er. When the standpipe is more than three-quarters full of water, which it should be much of the time, the available rates of flow would be greater. Some idea of the water pressures that will result may be had from Table 1.

Table 1. Static Pressures in Proposed Water Distribution System

Location	Maximum Static Pressure Standpipe Full lb. per sq. in.
Boston Road at Framingham Road	93
Main Street at Newton Street	84

Main Street at Cordaville Road	84
Main Street at Sears Road	95
Main Street at Lovers Lane	95
Ward Road at Brigham Street	84
Newton Street at Framingham Road	98
Deerfoot Road at Flagg Road	82
Cordaville Road at Woodland Road	74
Southville Road at Cordaville Railroad Station	80
Southville Road at Southville Railroad Station	73
Parkerville Road at Gilmore Road	60
South Union Schoolhouse	56

The proposed water works will be adequate to meet the needs of domestic service and fire protection of the more densely settled portions of the town and the works can be extended to reach other areas when funds are available and the need shall have developed. A connection can be made with the works of the Fayetteville Fire and Water District when desired, either for emergency use or to combine the systems into one.

The rebuilding of Worcester Turnpike to form the main thoroughfare between Boston and Worcester is likely to promote a rapid growth and demand for water along the turnpike. The system proposed can be extended, when necessary, to meet the needs of this area.

Table 2 gives list of streets with the sizes and lengths of pipe proposed, together with estimates of cost, which latter are referred to later.

The total lengths of pipe according to size are as follows:

10-inch	8,200 ft.
8-inch	38,180 ft.
6-inch	8,380 ft.
<hr/>	
Total cast iron pipe	54,760 ft. = 10.35 mi.
2-inch	1,740 ft.
1½-inch	950 ft.
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Total wrought iron pipe	2,690 ft. = 0.51 mi.
<hr/>	
Total pipe	57,450 ft. = 10.86 mi.

The small wrought iron pipe is proposed for use where only domestic service is required.

In planning the pipe distribution system and estimating costs, allowances have been made for gate valves at intersections and at other sufficiently frequent intervals to reduce the effect of any one break in the system. The plan includes sixty-one hydrants having two 2½-in. hose outlets and one large suction outlet for a pumper, connected to the main pipe by a 6-in. pipe with gate valve. The hydrants will be properly distributed throughout the settled areas adjacent to the water mains, in general, not over five hundred feet apart.

Table 2. Schedule of Pipe in Proposed Water Distribution System

Street	From	To	10"	Size of Pipe 8" 6" Length in feet	2"	1½"	Cost
Private Right of Way	Newton St.	Standpipe	900				\$8,100
Main St.	Pumping Station	Framingham Rd.		250			720
Main St.	Framingham Rd.	Sears Rd.	5,300	2,230			27,500
Lyman St.	Main St.	Northerly			840		960
Newton St.	Main St.	Northerly	2,000	4,900	1,000		27,000
Marlboro St.	Main St.	Northerly		1,350			4,500
Common	Main St.	Northerly			300		450
Walker St.	Main St.	Upland St.			310		710
Upland St.	Walker St.	Winchester			630		1,450
Winchester	Main St.	Boston Rd.		1,020			2,930
Boston Rd.	Winchester St.	White-Bagley Rd.		1,270			4,240
White-Bagley Rd.	Main St.	Beyond Railroad			1,000	600	3,860
Latisquama Rd.	Main St.	Southerly		1,100	600		5,320
Cordaville Rd.	Main St.	Southville		14,140			47,200
Middle Rd.	Main St.	Southville			860		2,370
Deerfoot Rd.	Main St.	Flagg St.		1,900	600		8,000
Cross St.						250	260
Railroad St.	Main St.	Southerly				300	310
Southville Rd.	Cordaville towards	Woodbury Rd.		1,300			4,340
Cottage St.	Hammond St.	Highland St.		280	230		1,450

Cottage St.	Cordaville Rd.	Cottage St.	300		930
Hammond St.	Cordaville Rd.	Cottage St.		390	900
Highland St.	Cottage St.	Parkerville Rd.	3,170		9,850
Pearl St.	Highland St.	Northerly		300	760
Parkerville Rd.	Southville Rd.	Richards Rd.	3,100	600	11,150
Southville Rd.	Parkerville Rd.	Westboro Line	1,370	600	5,750
Prentiss St.	Parkerville Rd.	Westerly		360	1,410
Wood St.	Southville Rd.	Southerly & Westerly		900	2,500
Private Right of Way	Highland St.	Standpipe	500		1,440
			<hr/>	<hr/>	<hr/>
Total lengths			8,200	38,180	1,740
Rock excavation				8,380	950
Total cost of distribution pipes				<hr/>	<hr/>
				18,140	\$199,000

Estimates of Cost of Construction

The estimates of cost of construction have been based on the assumption that cast iron pipe will cost \$41.00 per ton f.o.b. cars at a siding in the town, that cement-lined cast iron pipe will be used and that the work will be done in an efficient manner by contract under proper engineering supervision.

Estimates have been made of the quantity of rock excavation to be encountered based on an examination of the locality and available information:

The estimates also include the cost of services from the street main to the property line and the cost of a water meter for each service. The cost of service pipe within private property is not included, as this should be borne by the property owners.

The quantity of rock excavation to be encountered has been estimated from available information and a careful examination of local surface indications.

Method of Financing

Under Section 8, Chapter 44, of General Laws of Massachusetts a town or district may issue thirty-year serial bonds for the construction of water works. These bonds may be retired beginning three years after the date of issue, but the retirements cannot be larger in later years than in the early years, so that in effect retirement may be made in twenty-seven approximately equal annual payments.

Table 3. Estimated Cost of Construction of Proposed Water Works

Pumping Station and intake	\$23,800
Standpipes (1 400,000 gal., 1 250,000 gal.)	28,200
Distribution System	199,000
Services (261)	13,000
Land, rights of way, legal and other expenses	4,000
Total	\$268,000

There are three general methods by which the project could be financed:

1. The works could be built by the Town of Southborough as a town system. This method has the objection that property owners in Fayville would be taxed for the Southborough system as residents of the town and for the Fayville system as residents of the Fayville Fire and Water District. Furthermore, property owners in outlying sections not directly benefited, or not likely to be benefited within a reasonable period of years, would be required to pay a part of the cost of the proposed works in the tax levy. While it is true that these property holders would in time be benefited by a general increase in valuations and an increase in prosperity of the town, it may be considered unnecessary to tax them in this manner. On the whole, this plan does not seem feasible.

2. The existing Fayville Fire and Water District could be enlarged to include the areas in the villages of Southborough, Southville and Cordaville, which would be directly benefited by the proposed construction or which would be likely to receive direct benefit due to extensions within a reasonable period of years. If desired, the name of the district could be changed to the Southborough Fire and Water District. This plan has the advantages that

there would be only one water district in the town, it would be possible to operate the combined system somewhat more economically than two separate systems and there would be no danger of overlapping on rights in the water of Sudbury Reservoir.

3. A new district could be organized, to be known as the Southborough Fire and Water District, taking in the areas to be benefited at the start and those likely to receive water service within a reasonable period of years, excluding, of course, that of the Fayville Fire and Water District. Having organized such a district would not prevent the combining of this district with the Fayville district at some time in the future if it should be desired.

It would be necessary to obtain authority of the Legislature, through a special act, to organize the new district, in order that adequate funds may be obtained to carry on the work. Section 8, Chapter 44, of General Laws, authorizes a town or district to borrow money for the establishing of a water system to an amount not exceeding ten per cent of the last preceding assessed valuation of the town. The estimated cost of the proposed water works is in excess of the ten per cent limit, as was the case with the Fayville District.

Estimated Annual Cost of Operation

An estimate has been made of the annual cost of operating and maintaining the proposed works for the first six years, Table 4. Electric power has been figured according to the rate schedule for power of the Marlborough Electric Company.

Estimated Annual Fixed Charges

Table 5 gives a schedule of the estimated payments for interest on temporary construction loans

and on bonds and for bond maturities for a six-year period. These figures relate to the original construction program only and do not include extensions of the system. If there should be such within the period, the costs will be correspondingly changed. The total payments for interest and bond maturities are, also, given in Table 4, together with the total annual costs.

Estimated Annual Revenue

There will be two principal sources of revenue, the sale of water to consumers and payments by the town or district from taxes. On the basis of an average income of \$3.00 per month per service, assuming a minimum charge of at least \$2.00 per month per service, estimated annual receipts from the sale of water will be as shown in Table 6. The balances required to meet expenses must come from taxes. These amounts are also given in Table 6.

Effect of Installation of Water Works on Tax Rate

A study of the records of the assessors has been made to separate taxable property valuations according to districts, with the following results in round numbers:

Table 4. Estimated Annual Cost of Operation and Maintenance and of Fixed Charges Annual Operation and Maint.

	Year of Construction	1st	2nd	3rd	4th	5th
Supt., labor and clerical help	\$500	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500
Electric power for pumping	200	650	720	800	850	850
Oil, chlorine and miscellaneous	100	250	250	300	300	300
Total	\$800	\$2,400	\$2,470	\$2,600	\$2,650	\$2,650
Annual Fixed Charges						
Interest	\$6,100	\$8,150	\$12,060	\$12,060	\$11,830	\$11,380
Bond requirements				10,000	10,000	10,000
Total	\$6,100	\$8,150	\$12,060	\$22,060	\$21,830	\$21,380
Grand Total Annual Cost	\$6,900	\$10,550	\$14,530	\$24,660	\$24,480	\$24,030

**Table 5. Estimated Amounts and Maturities of Bonds and Interest and of Temporary Loans
For Construction**

(Exclusive of Extensions to System)		Bond		Interest on		Interest on	
Amount of		Maturities		Temporary Loans		Bonds at	
Year	Temporary Loans	Bonds		at 4 $\frac{3}{4}$ %		4 $\frac{1}{2}$ %	
of construction	\$268,000			\$6,100			
1st year of bond issue		\$268,000		2,120		\$6,030	
2nd " " "		268,000				12,060	
3rd " " "		268,000				12,060	
4th " " "		258,000			\$10,000	11,830	
5th " " "		248,000			10,000	11,380	

Table 6. Estimated Required Annual Revenue

Revenue	Year of Construction	1st	2nd	3rd	4th	5th
Sale of water estimated at \$3.00 per month per service—average*		\$6,520	\$7,960	\$8,890	\$9,400	\$9,400
Balance needed from tax levy		\$6,900	6,570	15,770	15,080	14,630
		<u>\$6,900</u>	<u>\$14,530</u>	<u>\$24,660</u>	<u>\$24,480</u>	<u>\$24,030</u>

*Based on a minimum charge of at least \$2.00 per month.

Total valuation of the town for tax purposes	\$3,200,800
Valuation of Fayville Fire and Water District	384,000
Valuation of villages of Southborough, Cordaville and Southville	2,313,000
	<hr/>
Valuation of area outside of the foregoing	\$503,000

For the period covered by Table 6 the building of a water works as proposed will cause an increase in the tax rate of estimated amounts varying from \$3.00 per \$1,000 of valuation in the year of construction to \$6.80 per \$1,000 in the third year of the bond issue.

Under the local conditions these costs apportioned over the taxable property of the district are reasonable charges for fire protection service and for the benefits which will result from the installation of the water works.

Recommendations

We recommend that the necessary steps be taken to enlarge the existing water district or to organize a new district in order that the villages of Southborough, Cordaville and Southville may be provided with a public water works. The convenience of an adequate and wholesome domestic water supply at all times, the value of the supply for fire protection and the stimulating effect upon the valuation and property of the town may amply justify the expenditures involved.

Respectfully submitted,
METCALF & EDDY
 By Frank A. Marston

Expense Report

Appropriation		\$2,500.00
Engineering Firm, Metcalf & Eddy	\$2,000.00	
William H. Murphy, Attorney	100.00	
Sarah E. McDonald,		
Stenographic Services	77.35	
Southborough Print Shop	207.00	
Mailing and Delivery of Report	15.00	
Total	<u>\$2399.35</u>	
Balance		<u>\$ 100.65</u>